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ABSTRACT

Programs which have been somewhat effective in reducing the rates of onset of regular tobacco use have featured such components as peer pressure resistance training, correction of normative expectations, inoculation against mass media messages, information about parental influences, information about consequences of use, public commitments, or peer opinion leaders. Most of these programs have been implemented by highly trained personnel. This study examined the effectiveness of a tobacco and alcohol prevention program delivered to sixth and seventh grade students by minimally trained classroom teachers. The program focused on: (1) teaching students to identify and resist peer influences; (2) information about short- and long-term consequences of tobacco and alcohol use; (3) the correction of normative expectations; and (4) the establishment of conservative intentions regarding tobacco and alcohol use. Two cohorts of students were pretested and, subsequent to delivery of the program, tracked longitudinally; the first cohort (N=1,221) was followed for 4 years, the second (N=1,707) was followed for 3 years. Results indicated that the program reduced the onset and prevalence of tobacco use but not of alcohol use. The effects for tobacco were differentially related to school district in which the program was delivered, sex of student, and ethnicity suggesting that prevention program content is only one variable that may affect the effectiveness of prevention interventions. (Author/NB)

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EVALUATION OF A TOBACCO AND ALCOHOL ABUSE PREVENTION CURRICULUM FOR ADOLESCENTS

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EVALUATION OF A TOBACCO AND ALCOHOL ABUSE
PREVENTION CURRICULUM FOR ADOLESCENTS

Abstract

This study examined the effectiveness of a tobacco and alcohol prevention program that was delivered to sixth and seventh grade students by minimally trained classroom teachers. The program focused on a) teaching students to identify and resist peer influences, b) information about short and long term consequences of tobacco and alcohol use, c) the correction of normative expectations, and d) the establishment of conservative intentions regarding tobacco and alcohol use. Two cohorts of students were pretested, and subsequent to delivery of the program, tracked longitudinally; the first cohort was followed for four years, the second was followed for three years. Results indicate that the program reduced the onset and prevalence of tobacco use but not alcohol use. The effects for tobacco were differentially related to school district in which the program was delivered, sex of student, and ethnicity suggesting that prevention program content is only one variable that may affect the effectiveness of prevention interventions.

EVALUATION OF A TOBACCO AND ALCOHOL ABUSE
PREVENTION CURRICULUM FOR ADOLESCENTS

Tobacco and alcohol are the two most commonly used non-prescription, psychoactive drugs in the United States today. The problems associated with smoking tobacco and abusing alcohol are well known and have been extensively documented. Smoking cigarettes has been identified as the single greatest cause of preventable morbidity and mortality in the United States[1]. Ravenholt[2] has estimated that 25% of all deaths in the United States are tobacco related. Ravenholt also estimated that alcohol related deaths accounted for approximately 5% of the United States total, while Noble[3] noted that others have estimated that up to 11% of all deaths are alcohol related.

Luce and Schweitzer[4] calculated that about 25% of the total economic cost of illness to the nation is attributable to smoking and alcohol abuse, with alcohol costs slightly higher than those attributable to tobacco. Besides costs related to illness, it is estimated that alcohol abuse costs over $6 billion in losses such as property damage from accidents and fires, and the proportionate share of costs for administering the criminal justice, highway safety, and social welfare systems[5].

The value of prevention versus treatment has been understood for some time[6]. Notable progress is being made in effectively treating smoking[7] and alcohol abuse[8], nonetheless, most treatments are still not widely effective in treating any substance use disorders and may occur too late to be of significant benefit. Treatment programs may eventually show promise, but it will probably never be reasonable to expect an approach that is exclusively treatment-oriented to be effective in controlling tobacco and alcohol use. Preventing the onset of regular use of substances in the first place appears to be the logical alternative.

With the recent development of effective approaches for preventing (or at least delaying) the onset of cigarette smoking, the possibilities of preventing abuse of other substances may be enhanced. Based on social psychological theories (e.g., Bandura's Social Learning Theory[9] and McGuire's Social Inoculation Theory[10]), previous work has shown moderate success in reducing the rates of onset of regular tobacco use[11-21]. Different programs have varied specific strategies used, nonetheless, these programs have featured one or more of the following components:

Peer Pressure Resistance Training. Students have been given instruction about the nature of peer pressure and have been taught how to resist pressures to use cigarettes. This has included descriptions and demonstrations of resistance techniques accompanied with some method of practicing these techniques.

Correction of Normative Expectations. Young people perceive tobacco and other drug use to be more prevalent or more acceptable than it really is[22]. Prevention programs have provided students with information about true prevalence rates and have reinforced attitudes favoring the unacceptability of use among peers.

Inoculation against Mass Media Messages. Some psychosocial prevention programs have provided students with information about the strategies that advertisers use to promote tobacco and teach critical analysis skills to counter the influence that advertisements may have. To a lesser extent, programs have also focused on countering the pro-tobacco use images that are portrayed in popular music, movies, and television programming.

Information about Parental Influences. Noting the correlation between parental cigarette smoking and student smoking, many programs have included some

information about parental influences. The message that parents who are not behaving appropriately need not be modeled is usually presented.

Information about Consequences of Use. Some programs have included additional components such as decision making training[23] to promote integration of factual knowledge. When information about the consequences of use has been included, short term and social consequences of use have typically been stressed[24,25]. Information has been presented using the Socratic method to capitalize on existing beliefs about the harmful nature of use (e.g., Flay, et al.[15]).

Public Commitments. Making personal commitments to not smoke, either via contract or reading a commitment that is video taped have also been included in many programs. This is done in an effort to bolster non-smoking attitudes using strategies well known to attitude researchers[23,26].

Peer Opinion Leaders. Most but not all of the programs cited above have included peer opinion leaders in the delivery of the program. While the selection and training of peer leaders has varied greatly from program to program, there generally appears to be confidence in using students in delivering all or some of the program[27]. The purpose of including peer leaders is to enhance the believability of program messages especially among rebellious or authority-denying participants.

The majority of these programs have featured implementation by highly trained individuals, typically health educators employed by the project, who have been supervised closely by researchers who developed the program. Few if any studies have been conducted to test the effectiveness of these programs when delivered by classroom teachers with minimal training and supervision[27].

While the majority of programs have focused on tobacco, there is some reason to believe that the theoretical basis of the program is applicable to other substances as well[28]. For instance, the relationship between using one substance and the onset of multiple substance use has been well documented[29-32]. Further, preliminary data published by McAlister, et al.[19] suggests that multiple substances may be affected by the onset of alcohol and marijuana as well.

The purpose of the TAPP project was to conduct an evaluation of a tobacco and alcohol prevention program to determine the degree to which it would be possible to prevent the onset of use of these substances using a state-of-the-art program implemented by minimally trained instructors. Thus, in contrast to an efficacy study, in which a intervention is tested to see if it can work with full and well controlled implementation, this study was designed as an effectiveness study to determine if the intervention worked with a more naturalistic implementation, that is, where full implementation could not be assured where varying levels of skill and commitment among the teachers existed.

METHOD

Sample.

Two cohorts of students were involved in this study. All students came from districts that were located in the Los Angeles metropolitan area.

Cohort-1

Cohort-1 students came from two moderate sized school districts in Los Angeles county. The first district (District A) was located in the extreme southern portion of Los Angeles County and had approximately 22,000 students in grades K-12. This district was an ethnically diverse district with socio-

economic status ranging from lower class to upper-middle class. The second school district (District B) was located east of the City of Los Angeles in suburban city and had approximately 7,600 students. This was a more homogenous district ethnically and socio-economically and was composed primarily of middle to upper-middle class whites A total of 556 students in District A and 665 students in District B participated in the research. Ethnic composition of this cohort was 66.1% white, 11.8% asian, 3.8% black, 4.3% latino, 2.0% American Indian, and 12.0% unclassified. Females (51%) and males (49%) were equally represented.

Cohort-2

Cohort-2 students also came from two districts. A second cohort of 1379 seventh grade students came from District A. In the second cohort-2 school district (District C), 328 sixth grade students from four elementary schools participated in the study. District C was located in a city that has one of the highest per capita incomes of any city in the United States. The schools in this district, with a total enrollment of approximately 5,600 K-12 students, have a reputation for academic excellence. In cohort-2, 51% were male, 53.5% were white, 17.3% were asian, 13.5% were latino, 6.7% were black, 2.3% were American Indian, and 6.6% were unclassified.

Research Design.

For both cohorts, a pretest, multiple-posttest quasi-experimental design with schools assigned either to receive or not receive the TAPP curriculum was adopted. Those not receiving the TAPP curriculum were not discouraged from continuing whatever tobacco and alcohol program that was normally provided. Thus, rather than being pure controls, they are more appropriately viewed as

standard treatment comparison schools. At the time of the interventions, 1981 through 1983, comparison schools reported providing only factual consequence information about tobacco and alcohol to their students.

In both cohort-1 districts, one school was assigned to receive treatment as usual, with one school in District A and two schools in District B assigned to receive the TAPP curriculum. Cohort-1 students were pretested during their seventh grade year, after which students in treatment schools received the TAPP curriculum. All students in this cohort were then scheduled to be posttested five times. $Posttest_1$ occurred at the end of these subjects' seventh grade year; $posttest_2$ occurred in the fall semester of their eighth grade year; $posttest_3$ occurred in the spring of their eighth grade year; $posttest_4$ occurred in the spring of their ninth grade year; and $posttest_5$ occurred during the spring of their tenth grade year.

In cohort-2 of District A, two schools were assigned to receive treatment as usual and three were assigned to receive the TAPP curriculum. The schools that participated in cohort-1 from District A maintained their previous assignment. The elementary schools from District C were assigned two per condition. Students from cohort-2 were pretested in the fall of their seventh (District A) or sixth (District C) grade year, after which students in the treatment condition received the TAPP curriculum. Students from the cohort-2 were posttested three times. $Posttest_1$ occurred six months after the pretest; $posttest_2$ occurred approximately eighteen months after the pretest; and $posttest_3$ occurred approximately 30 months after the pretest. Thus the students in District A were followed through the ninth grade, and those in District C, who received the curriculum in the sixth grade, were followed through the eighth grade.

Instrumentation.

A 102 item questionnaire was completed by the students both before and after implementation of the curriculum. Included in the questionnaire were questions about the following demographic variables: age, sex, race/ethnicity, and religion. The questionnaire contained items that assessed cigarette and alcohol use during the 30 days prior to administration of the survey and number of alcoholic drinks consumed during the past 30 days. These measures have been used by many previous studies of adolescent alcohol and tobacco use[27].

Data Collection Procedures.

Prior to administration of the questionnaire, passive informed consent was obtained via letters which were sent home to parents informing them of the study and which provided a mechanism to withdraw their child from the study[33]. Questionnaires were administered by project staff who were unknown to the students.

Early studies assessing validity of self-report of smoking by adolescents indicated that the collection of a physiological specimen contributed to up to a 50% increase in self-reported smoking among those students from whom specimens were collected[34-36]. Subsequent studies have indicated that self-report may be an accurate measure of behavior if adequate safeguards of confidentiality are taken[37-39]. Using the method described by Luepker and his colleagues[34], saliva specimens were collected in conjunction with the administration of the questionnaire in an attempt to increase the accuracy of self-reports of behavior[35].

Saliva collection procedures were administered in conjunction with questionnaire administration to the first cohort of students through $posttest_3$

and to the second cohort of students for the pretest and $posttest_1$.

Treatment.

The curriculum package that was presented to students was designed to incorporate the programmatic components discussed above, i.e. peer pressure resistance training, the correction of normative expectations, inoculation against mass media messages, information about parental influences, information about consequences of use, and making public commitments to not smoke and drink. Peer opinion leaders were utilized to assist teachers with program delivery.

The curriculum was fifteen sessions in length with each session requiring approximately 50 minutes to deliver. An additional 45-50 minute session to train peer opinion leaders was also included. Students were provided with workbooks that contained sheets for completing written activities. A significant effort was made to create activities that were involving and capitalized on existing knowledge. Activities that addressed the correction of normative expectations and inoculation against media message featured the use of discussion. Role play was utilized to develop peer pressure resistance skills.

Teachers from the treatment schools were selected by district administrators and principals. District A selected health education teachers to deliver the program. District B initially selected science teachers to implement the program. Due to the program's non-biological approach, social studies teachers were ultimately given the responsibility to implement the program.

Cohort-1 teachers ($n = 8$) were trained to deliver the program in a two-day seminar. Training included discussion of the theory and rationale behind the curriculum, discussion of the contents of the curriculum, and discussion of the methods to be used in teaching the curriculum. Areas that the staff felt were

particularly important were covered in some detail. This included the selection and training of group leaders, and role-playing cigarette and alcohol refusal skills. The teachers practiced teaching a number of the curriculum lessons.

As with cohort-1, teachers for cohort-2 (n = 9) were selected by school district administrators. In district C, sixth grade teachers were given the responsibility for delivering the program. Training was similar to that conducted for cohort-1 teachers, but was compressed into a one day session.

Analysis Procedures.

Data were analyzed using chi-square analyses for dichotomous 30-day use measures for tobacco and alcohol and for a constructed dichotomous heavy-use of alcohol measure (5 or more drinks per month). One incidence and two prevalence analyses were conducted to determine the overall effectiveness of the program on preventing the onset of each substance with cohort-1 subjects. The rationale underlying the use of multiple analyses was to attempt to gain convergence from analyses in which samples were slightly different. Thus, if there was convergence between analyses that a) included as many people as possible or b) included only those who were present at all posttests or c) examined only those who were not currently using at the pretest, program effectiveness would be more correctly determined. Samples composed of subjects who were present at all posttests were used in major analyses but were abandoned for some post hoc sub-analyses when attrition was too great.

RESULTS

Cohort-1: Cigarette Smoking

The prevalence of smoking in treatment and comparison schools as observed by

including as many subjects as possible at each posttest is depicted in Figure 1. From these results, there appears to be a mild program effect favoring the curriculum at the ninth and tenth grade measurements. Although there were relative reductions in use of 19.1% and 19.6% for treatment schools at $posttest_4$ and $posttest_5$, these differences were not statistically significant ($p = .10$ and .13 for these respective posttests).

Insert Figure 1 about here.

The second prevalence analysis included only subjects who were present at all six points of data collection. The results of this analysis are presented in Figure 2. Analysis revealed that at $posttest_5$, students who had received the treatment program had a significantly lower prevalence of smoking ($p = .05$). This represents a reduction of smoking associated with receiving the program of 38.9%.

Insert Figure 2 about here.

The incidence of smoking for the treatment and comparison groups is shown in Figure 3. Although there appears to be a trend favoring the treatment program with a reduction in onset of 16.7% and 17.5% at $posttest_4$ and $posttest_5$ respectively, the effects observed were not sufficiently strong to reach statistical significance.

Insert Figure 3 about here.

No confirmation of overall program effectiveness in reducing the prevalence or onset of cigarette smoking can be found in these results. However, the convergence of the results insofar as the general direction of effect suggests that the program may have had a minor overall effect in reducing smoking. To explore the possibility that there were conditions under which the program was not effective, post hoc analyses involving repeating the above three analyses for defined subgroups were conducted. These included analyses by school district, sex, and ethnicity.

Effect of School District.

The school districts that participated in the program appeared to have been different in socio-economic makeup and in how they implemented the program. This difference was supported when analyses were conducted with each school district separately. As can be seen in Table 1, there was relatively good convergence among the three analyses. The program failed to produce any significant effect in District A. In District B there appeared to be a strong final impact of the program.

Insert Table 1 about here.

The patterns of use in District B suggest that the reason for the observed delay in effectiveness of the program had to do with the fact that there was practically no onset until these students entered high school. For example, examining the prevalence of use for subjects who were present during any data collection period reveals that at $posttest_3$ the rate of use was 8.4% for treatment and 7.7% for comparison subjects. At $posttest_4$, treatment subjects increased to 22.3% and comparisons increased to 30.1%. By $posttest_5$, 39.8% of

comparison subjects had smoked during the month prior to measurement while 26.7% of treatment subjects reported doing so. Estimating prevalence using the other method and estimating incidence generally reveal the same pattern of no onset even among the comparisons until subjects were in the ninth grade.

There does not appear to be support for the program as implemented in District A. An examination of the onset patterns for this district revealed that the prevalence and incidence of smoking gradually increased among treatment subjects. Similar to the comparisons in District B, there was little onset among the comparisons in District A until $posttest_4$, and even then onset was very limited. Thus, not only did the program appear to be ineffective in achieving a marked reduction in onset, but the treatment-as-usual program that was delivered to the comparisons appeared to be relatively effective in reducing onset. Unfortunately, there was little documentation of what kinds of programs comparison subjects received.

Effect of Sex.

The results of the program calculated for each sex separately are presented in Table 2. These results suggest that there may have been a differential effect of the program for girls than for boys. However, it is clear that the effects on females was not strong since only marginal significance was reached and that only at the final posttest. In contrast, there is no evidence that the program was effective in preventing the onset of smoking among males whatsoever.

Insert Table 2 about here.

Effect of Ethnicity.

The effects of the program for each of three ethnic sub-groups are presented in Table 3. There is no evidence that the program was effective in preventing the onset of smoking among asians or other minorities, although at the initial posttest, fewer other minority students in treatment schools had smoked than had other minorities in comparison schools (9.1% versus 18.9%). However, there was clearly no long term effect. The program appeared to be moderately successful among white students with prevalence at $posttest_4$ reduced from 32.8% in the comparisons to 25.7% in treatment subjects and reduced at $posttest_5$ from 39.1% in comparisons to 29.9% in treatment subjects.

Insert Table 3 about here.

Cohort-1: Alcohol

No significant effects of the program and no systematic trends of differences in onset rate of either type of alcohol use were observed in any analysis performed. From the prevalence and the incidence data, the onset of alcohol use appeared to be gradual and regular. For example, the prevalence of alcohol use (thirty-day use) went from 38% at seventh grade pretest to 55% at tenth grade posttest for cohort-1 subjects. Thus, despite an opportunity to affect alcohol use, no effects were seen. This was true for low level use (any use in the month preceding) and for the higher level of use (5 or more times in the preceding month). Exploratory post hoc analyses similar to those conducted for smoking failed to yield any systematic findings.

Cohort-2: Cigarette Smoking

Analyses of data for the second cohort of subjects followed the procedures

outlined above with the exception that since two grades were involved, each grade was analyzed separately. Grade was confounded with school district, resulting in analyses similar to the post hoc analyses for school district that were completed with cohort-1.

Results of these analyses (see Table 4) suggest that the program appeared to be effective for the sixth grade implementation in District C. Two of the three posttest$_3$ analyses yielded statistically significant results favoring the program. The appearance of significant results may in part be due to a large increase in smoking in the comparison group during their eighth grade year. Based on the incidence analysis at posttest$_3$, 3.9% of treatment and 16.3% of comparisons had begun smoking. The most liberal prevalence analysis revealed that 5.6% of treatment and 16.2% of comparisons were smoking at posttest$_3$. The remaining analysis resulted in prevalence estimates that favored the program with the rate of use in the comparison schools at 20.0% compared to 8.3% in the treatment schools. Although this is a large difference (representing a reduction in use of 58.8%), it is based on small numbers and therefore did not reach significance.

Insert Table 4 about here.

As with the cohort-1 analysis, the results for the seventh grade students in District A was not impressive. It appeared that there may have been a pretest bias favoring the comparison group. Posttest$_3$ results favored the comparison subjects who had less incidence (9.9% vs 20.3%) and prevalence (13.5% vs 21.6%) of smoking than treatment students. At posttest$_4$, this difference disappeared with comparisons incidence rates being roughly equal to that treatment subjects

(23.4% vs 24.7%, respectively) and prevalence rates being nearly identical (28.6% vs 27.7%, respectively). As with the cohort-1 analyses, it is clear that the program did not have the intended effect and it is possible that a competing program was effective or perhaps that there may have been an interactive selection-maturation bias that favored the comparison schools.

Cohort-2: Alcohol

Results of the second cohort implementation for drinking are presented in Table 5. It is apparent that there was a difference among schools in District A with comparisons having less alcohol use than treatment schools at the pretest and at most posttests. This bias — whether due to selection differences or competing programmatic influences — precludes an evaluation of the impact of the program. We must assume that the program had relatively little or no effect in reducing the prevalence or incidence of alcohol use in this district.

Insert Table 5 about here.

There was an early negative effect of the program on low level alcohol use in District C. At the initial posttest, 35.3% of treatment subjects reported using alcohol in the month prior to testing whereas only 23.5% of comparisons reported using alcohol. However, this negative effect was short lived and was completely eliminated at the second posttest. The negative implications of this posttest difference are also ameliorated when pretest-posttest changes are examined. In both treatment and comparison conditions, the prevalence of low level alcohol use was reduced between pretest and posttest, there appeared to be no discernable effect of the program on alcohol use among sixth grade students in District C.

DISCUSSION

The results of this project suggest that the TAPP program was partially effective in preventing the onset of substance use. It appeared that the program's effectiveness was mediated by several factors including the target behavior, the target audience, and characteristics of the deliverer. Thus, the program was effective in preventing the onset of tobacco but not alcohol. The program was effective among females more than among males. The program was effective among whites but clearly less so among minority groups. Finally, the program was effective in some but not all of the schools.

The program was effective for preventing the onset of tobacco use but not alcohol. While the known predictors and correlates of tobacco and alcohol use are similar, it may be that there are major differences between alcohol and tobacco that were not taken into account in designing the program. For example, even though the use of both may correlate with such constructs as the number of friends who use, peer pressure as the mechanism by which the use is initiated may be valid only for tobacco. On the other hand, since the use of alcohol is so much more prevalent in our society and since abuse is more difficult to define, it is perhaps easiest to encourage students to use peer pressure resistance strategies when offered tobacco for which peer pressure may be less severe and less persistent compared to alcohol.

The results of this study generally support previous findings of other researchers who have examined the prevention of cigarette smoking. However, compared to other recent reports of programs based on the social psychological model of prevention that was first espoused by Evans[6] and his colleagues, the results of this project were neither as consistent nor as striking as are many that have been presented in the literature.

Since this test involved implementation by minimally trained teachers, a major question concerns the effectiveness that can be expected from programs when they are disseminated and delivered by typical school personnel. We can offer no proof that there were systematic teacher errors in delivering the program, nonetheless, the range of competence with which relatively technical programs such as TAPP are delivered clearly creates the opportunity for decrements in effectiveness to occur. Many teachers may be deficient in skills or attitudes required to deliver prevention programs effectively. Not to blame the teacher solely, it may also be that districts, communities, or other elements that influence life within a classroom may interfere with the adequate delivery of the program. Finally, adequately motivating and instructing the teacher in program delivery methods deserves careful attention. Providing adequate training may be a significant challenge for those disseminating prevention programs. The number of unknowns is large, but it is clear that these explanation should be considered as plausible reasons for program failure.

The effectiveness of the program seen for whites and females is both encouraging and disappointing. Whites and females constitute a large sub-group in the population. Easy to deliver programs that are truly effective in reducing smoking among either or both of these groups would be advantageous to implement. At the same time, programs that are not effective for males and non-whites raise a concern for these groups since smoking is as or more prevalent among these sub-groups. It is perhaps important to consider whether or not the same psychosocial constructs apply to all sub-groups equally well. Even though peer use may predict the onset of use in each of these sub-groups, peer pressure to conform as the mechanism by which young males and non-whites are induced to try and experiment with tobacco may be inadequately conceived.

Methodological Concerns.

While this report raises hope as well as some questions, it must obviously be judged somewhat on the strength of the experimental design employed. Using quasi-experimental methods inevitably brings a number of potential sources of invalidity to an experimental trial that must be seriously considered in interpreting that study. It is appropriate for threats to validity, especially internal validity to be considered.

As outlined by Campbell and Stanely[40] and Cook and Campbell[41], there are several major sources of threat to internal validity that must be considered. These include history, testing, selection, instrumentation, regression, attrition (mortality), maturation, selection by maturation, and contamination of the comparison groups. Because of the use of random assignment to conditions and the use of standardized procedures for data collection, such rival hypotheses as history, testing, instrumentation, and regression can be ruled out. On the other hand, selection, attrition, selection by maturation interaction, and contamination of the comparison groups are subject.

Because of the relatively small numbers of schools involved, naturally existing school differences that could account for observed effects must be considered. In the first cohort, three schools were assigned to each condition. The school districts themselves were quite different in terms of ethnic and socio-economic makeup. The schools in District B, in which the effect of the program apparently occurred, was more uniform insofar as obvious differences between schools is concerned. Since all three junior high schools in this district merged at the ninth grade into a common high school, a selection bias and a selection by maturation interaction bias for these particular results seems to be more or less ruled out. District A was more diverse with comparison

schools apparently of a higher socio-economic status than treatment schools. Since use actually declined in the comparison schools in this district between pretest and initial posttest, it is suspected that the comparison schools may have received an alternate program. Thus, contamination, selection, and a selection by maturation interaction bias all may have interfered with observing any program effects in this district. However, since the onset rates in the treatment school in this district were relatively steep, there does not appear to be much evidence that any program effects occurred.

Attrition.

Attrition can be tested as was proposed in Hansen, Collins, Malotte, Johnson, and Fielding[42]. Since the possible loss of external validity has already been documented in the above mentioned report, the focus of the reporting here will be on threats to internal validity posed by differential attrition between conditions. Analyses were conducted for rates of attrition of program versus comparison schools for all posttests of cohort-1 and cohort-2 subjects. No differentiation was found for cohort-2 subjects. Thus, attrition is not a threat to interpreting cohort-2 results.

For cohort-1 subjects on the other hand, there was an attrition problem at posttest5. (The remaining posttests were not significantly affected by differential attrition.) Contrasting treatment subjects with comparisons, more comparison subjects were drop outs (61%) than treatment subjects (46%; X^2 = 28.77; $p < .001$). Since more smokers dropped out than non-smokers (65% versus 52%; X^2 = 6.48; $p < .02$) and since smokers in the comparison condition were more likely to drop out than smokers in the treatment condition (76% versus 56%; X^2 = 20.88; $p < .001$), the logical conclusion of this pattern of attrition is one that is counter to the attrition threat. In other words, the findings of a successful

program would be most threatened if it were the case that fewer comparison smokers dropped out.

Thus, the possibility that the positive results of the study were a consequence of selective attrition by smoking treatment subjects appears to be dismissed and the overall threat to the internal validity of the study posed by this differential attrition seems to be minimal. In a sense, the differential impact of the program on smoking was found in spite of attrition that should have minimized its observance.

CONCLUSION

Students received a tobacco and alcohol abuse prevention program that emphasized peer pressure resistance training, information about consequences of use, and decision making training. Subsequently, students were monitored for tobacco and alcohol abuse. The program was delivered by regular classroom teachers who had been trained briefly in the program's methods. Compared to no-treatment comparisons, treatment subjects evidenced a 20% reduction in the prevalence of smoking by the final posttest. No effects of the program on alcohol use were observed. A post hoc examination of the smoking data indicated that the program was differentially effective for various sub-categories of subjects. Females were affected by the program but not males. The program was effective among white subjects but did not reduce smoking among Asians, Hispanics, Blacks, or other minorities. The program was very effective in several but not all of the school districts in which it was delivered. These results support current notions about effective education that that suggest that programming may be differentially effective depending upon such factors as to whom and by whom the program is delivered[43].

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TABLE 1

OVERALL SMOKING OUTCOMES FOR PROGRAMS DELIVERED
TO COHORT-1 STUDENTS WHEN COMPARED TO THEIR WITHIN-DISTRICT COMPARISONS
RESULTS FROM CHI-SQUARE ANALYSES

DIST	TYPE	POSTTESTS	N	OUTCOME* DIRECTION POSTTEST P	1	2	3	4	5	OUTCOME SIGNIFICANCE POSTTEST P	1	2	3	4	5
A	INCIDENCE	ANY	411		0	0	-	0	0				.02		
A	PREVALENCE	ALL	40	0	0	0	0	0	0						
A	PREVALENCE	ANY	556		0	0	0	-	0	0			.07		
B	INCIDENCE	ANY	539		0	0	0	+	+					.08	.01
B	PREVALENCE	ALL	142	0	0	0	0	0	+						.01
B	PREVALENCE	ANY	665	-	-	0	0	+	+	.03	.05			.09	.01

* A plus (+) indicates a result favoring the TAPP program which was significant at $p < .10$; a minus (-) indicates a result favoring controls which was significant at $p < .10$; a zero (0) indicates no clearly directional result.

TABLE 2

SMOKING OUTCOMES FOR COHORT 1 MALES AND FEMALES
WHEN COMPARED TO SAME SEX COMPARISONS
RESULTS FROM CHI-SQUARE ANALYSES

DIST SEX	VARIABLE	TYPE	POSTTESTS	N	OUTCOME* DIRECTION POSTTEST P	1	2	3	4	5	OUTCOME SIGNIFICANCE POSTTEST P	1	2	3	4	5
FEMALE	SMOKING	INCIDENCE	ANY	573		0	0	0	0	0		.35	.81	.18	.29	.15
FEMALE	SMOKING	PREVALENCE	ANY	624	0	0	0	0	0	+	.27	.14	.14	.56	.11	.10
MALE	SMOKING	INCIDENCE	ANY	545		0	0	0	0	0		.31	.93	.90	.59	.86
MALE	SMOKING	PREVALENCE	ANY	597	0	0	0	0	0	0	.41	.14	.84	.46	.59	.73

* A plus (+) indicates a result favoring the TAPP program which was significant at $p < .10$; a minus (-) indicates a result favoring controls which was significant at $p < .10$; a zero (0) indicates no clearly directional result.

TABLE 3

SMOKING OUTCOMES FOR COHORT-1 ASIANS, WHITES AND OTHER MINORITIES
WHEN COMPARED TO COMPARISONS FROM THE SAME ETHNIC GROUP
RESULTS FROM CHI-SQUARE ANALYSES

ETHNIC GROUP	TYPE	POSTTESTS	N	OUTCOME* DIRECTION POSTTEST P	1	2	3	4	5	OUTCOME SIGNIFICANCE POSTTEST P	1	2	3	4	5
ASIAN	INCIDENCE	ANY	131		0	0	0	0	0						
ASIAN	PREVALENCE	ANY	133	0	0	0	0	0	0						
MINORITY	INCIDENCE	ANY	218		0	0	0	0	0						
MINORITY	PREVALENCE	ANY	243	0	0	0	0	0	0						
WHITE	INCIDENCE	ANY	682		0	0	0	0	+						.09
WHITE	PREVALENCE	ANY	745	0	0	0	0	0	+						.08

* A plus (+) indicates a result favoring the TAPP program which was significant at $p < .10$; a minus (-) indicates a result favoring controls which was significant at $p < .10$; a zero (0) indicates no clearly directional result.

TABLE 4

OVERALL SMOKING OUTCOMES FOR PROGRAMS DELIVERED
TO COHORT-2 STUDENTS WHEN COMPARED TO THEIR WITHIN-DISTRICT COMPARISONS
RESULTS FROM CHI-SQUARE ANALYSES

DISTRICT	TYPE	POSTTESTS	N	OUTCOME DIRECTION POSTTEST P	1	2	3	OUTCOME SIGNIFICANCE POSTTEST P	1	2	3
A	INCIDENCE	ANY	1195		0	0	0				
A	PREVALENCE	ALL	258	0	0	-	0			.00	
A	PREVALENCE	ANY	1379	-	0	-	0	.00		.02	
C	INCIDENCE	ANY	309		0	0	+				.00
C	PREVALENCE	ALL	98	0	0	0	0				
C	PREVALENCE	ANY	328	0	0	0	+				.03

* A plus (+) indicates a result favoring the TAPP program which was significant at $p < .10$; a minus (-) indicates a result favoring controls which was significant at $p < .10$; a zero (0) indicates no clearly directional result.

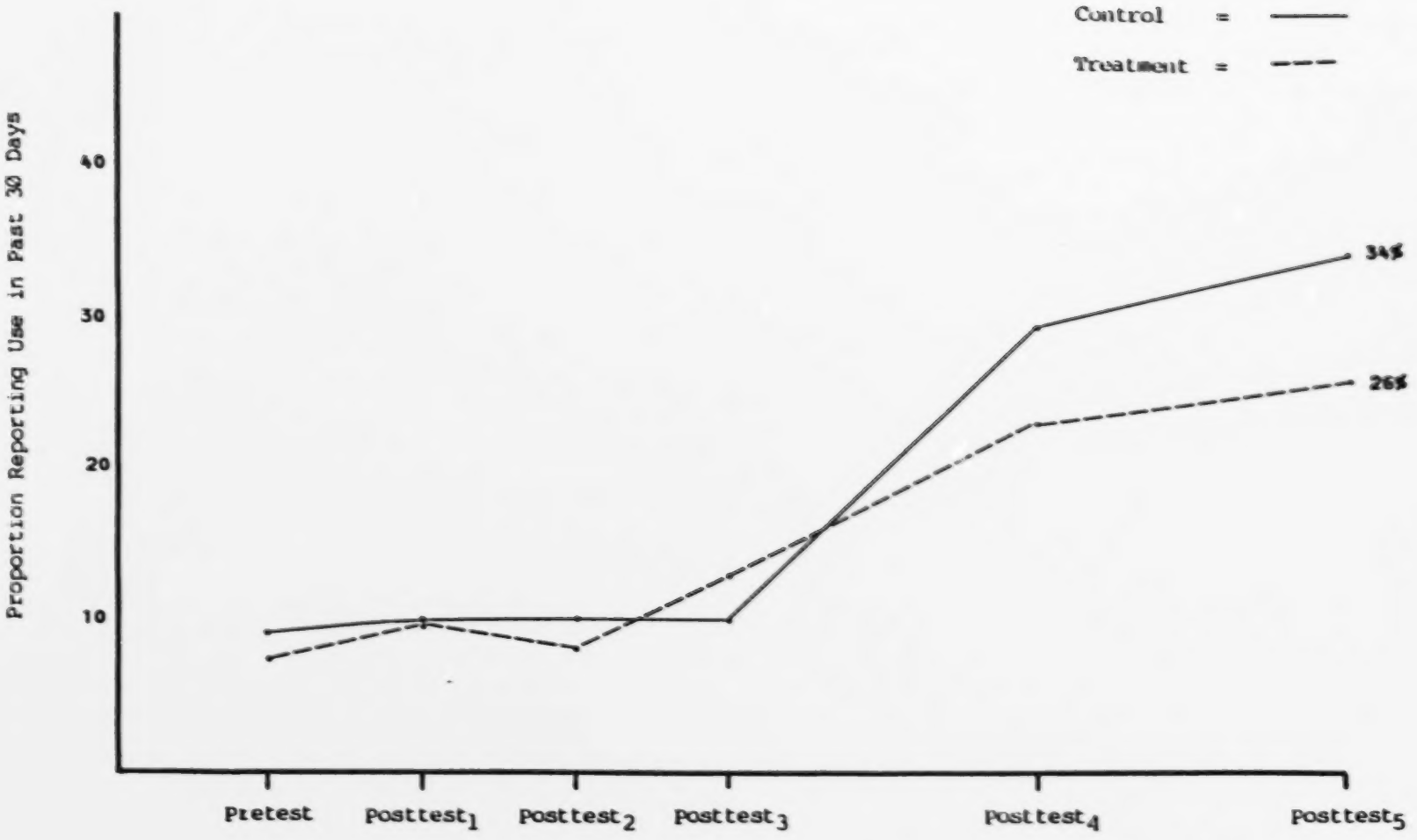
TABLE 5

OVERALL DRINKING OUTCOMES FOR PROGRAMS DELIVERED
TO COHORT-2 STUDENTS WHEN COMPARED TO THEIR WITHIN-DISTRICT COMPARISONS
RESULTS OF CHI-SQUARE ANALYSES

DIST.	MEASURE	TYPE	POSTTESTS	N	OUTCOME* DIRECTION POSTTEST P 1 2 3	OUTCOME SIGNIFICANCE POSTTEST P 1 2 3
A	DRINKING	INCIDENCE	ANY	952	0 0 0	
A	DRINKING	PREVALENCE	ALL	258	- 0 - -	.02 .10 .07
A	DRINKING	PREVALENCE	ANY	1379	- - - 0	.00 .01 .01
A	HEAVY DRINKING	INCIDENCE	ANY	1359	0 0 0	
A	HEAVY DRINKING	PREVALENCE	ALL	258	0 0 0 0	
A	HEAVY DRINKING	PREVALENCE	ANY	1379	- - - 0	.00 .01 .01
C	DRINKING	INCIDENCE	ANY	204	0 + 0	.08
C	DRINKING	PREVALENCE	ALL	98	0 - 0 0	.03
C	DRINKING	PREVALENCE	ANY	328	0 - 0 0	.04
C	HEAVY DRINKING	INCIDENCE	ANY	324	0 0 0	
C	HEAVY DRINKING	PREVALENCE	ALL	98	0 0 0 0	
C	HEAVY DRINKING	PREVALENCE	ANY	328	0 0 0 0	

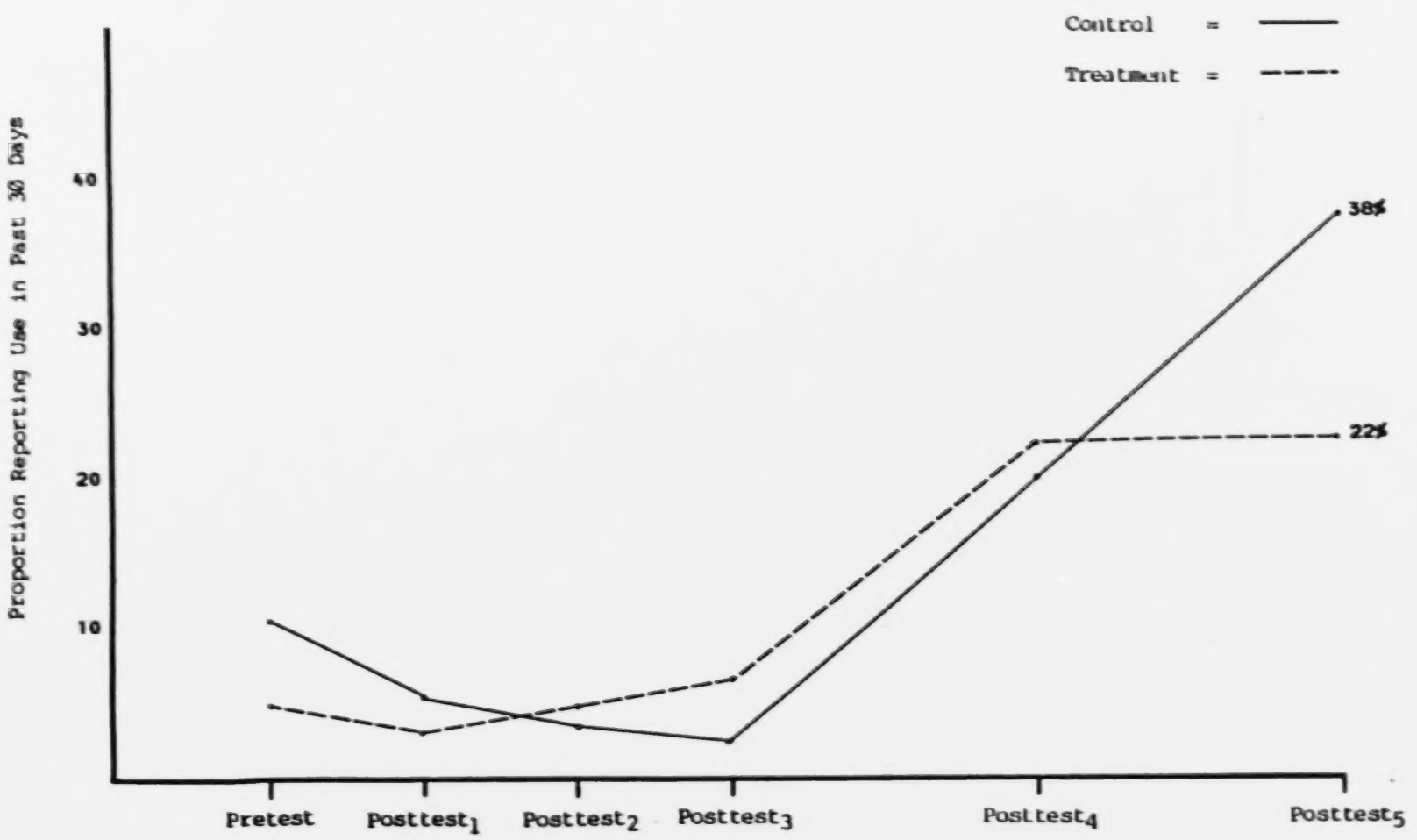
* A plus (+) indicates a result favoring the TAPP program which was significant at $p < .10$; a minus (-) indicates a result favoring controls which was significant at $p < .10$; a zero (0) indicates no clearly directional result.

FIGURE 1



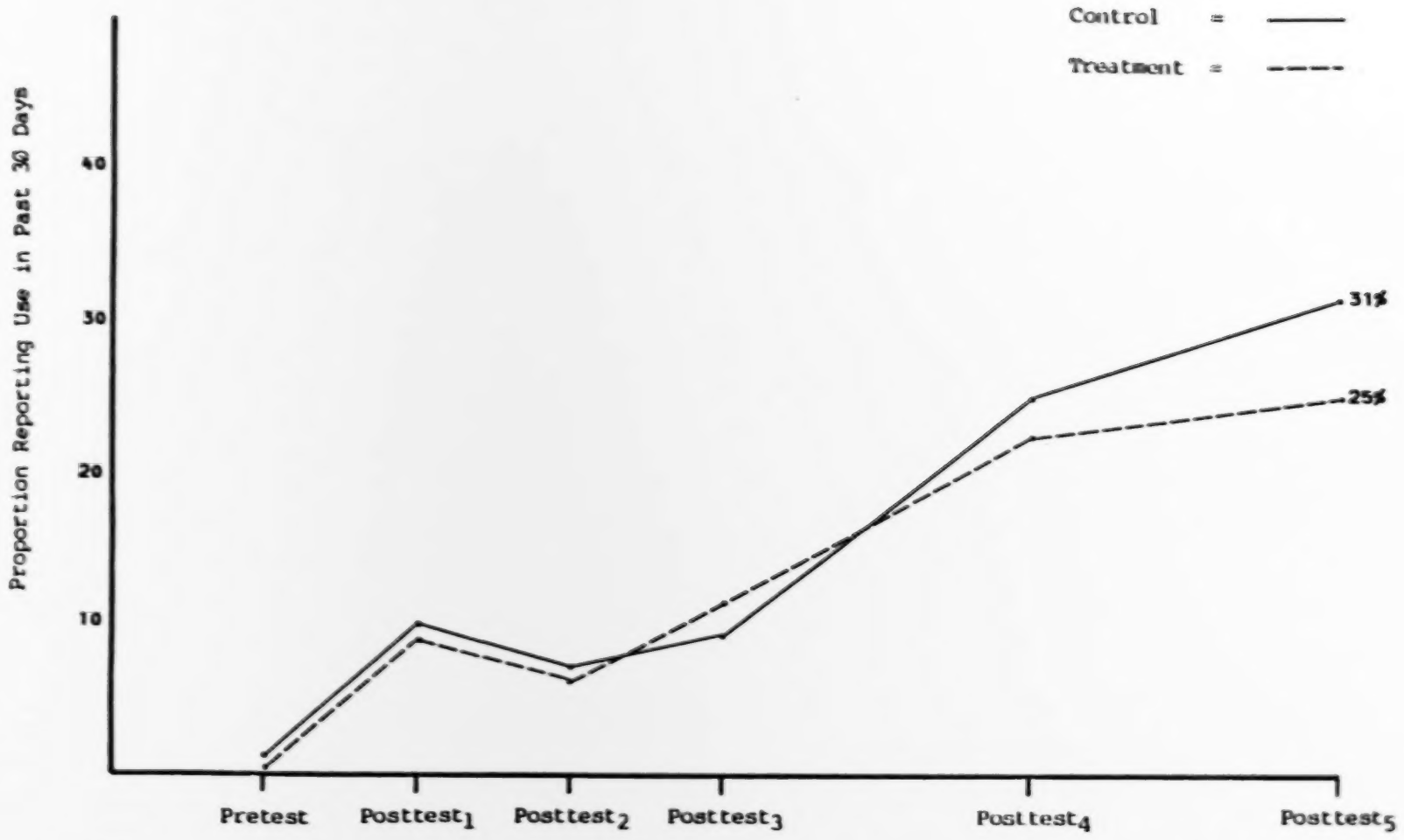
Prevalence of Smoking for Subjects Present at Pretest and Any posttest

FIGURE 2



Prevalence of Smoking for Subjects Present at Pretest and All posttest

FIGURE 3



Incidence of Smoking for Subjects Present at Pretest and Any posttest